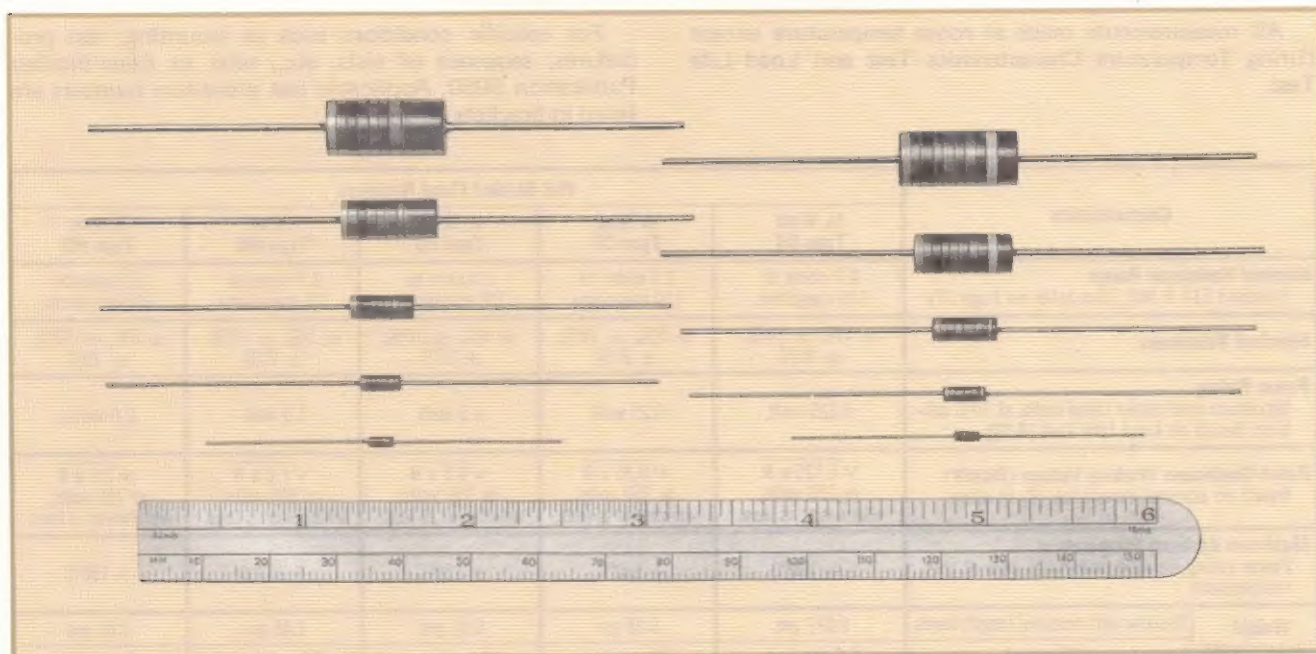




General Purpose
Metal Clad
Reel Packaged

HOT-MOLDED
FIXED
RESISTORS

TYPES
BB • CB • EB
GB • HB • GM • HM



Years of accumulated experience have shown that Allen-Bradley hot-molded resistors are unequalled for uniformity, predictable performance, appearance, and freedom from catastrophic failure.

Allen-Bradley resistors are made by an exclusive hot-molding process on automatic machines — developed, built, and used only by Allen-Bradley. There is such complete uniformity from one resistor to the next — million after million — that long term in-circuit performance can be predicted with usable accuracy.

When used according to published ratings and recommendations, Allen-Bradley hot-molded fixed resistors will not open circuit nor exhibit erratic changes of resistance value. They are probably the most reliable of all electronic components.

OUTSTANDING FEATURES

UNIFORM QUALITY — Consistent performance for over 35 years, no difference in quality regardless of value, rating, or tolerance purchased: One grade — the finest.

RELIABLE — Recognized as the most reliable of all electronic components, Allen-Bradley hot-molded resistors provide freedom from catastrophic failure when used within ratings.

PREDICTABLE PERFORMANCE — Because of their outstanding uniformity, A-B hot-molded resistors exhibit consistent responses to environment and loading.

CONSERVATIVE RATINGS — All performance specifications are based on extensive testing and massive field experience.

TRACKING — Allen-Bradley resistors exhibit extremely uniform tracking characteristics. For example, in flip-flop circuits, resistors used in pairs which are drawn from the same package or reel (a normal mass production practice) will track with each other throughout changes of temperature, humidity, and load. This assures reliable circuit performance throughout the design life of the equipment.

WIDE RANGE OF VALUES — Available in standard preferred number values from 1 ohm to 100 megohms. Special values available on request.

HIGH RESISTANCE VALUES — Resistance values from 100 megohms to 1 million megohms and above are available on special order.

RUGGED CONSTRUCTION — The solid, integral structure, combining leads, insulation, and resistance material in the exclusive A-B hot-molding process provides exceptional strength and resistance to damage in automatic handling machinery.

SOLDERABLE/WELDABLE LEADS — Hot solder coated leads remain easy to solder even after long periods in stock. The oxygen-free copper leads are readily weldable and allow considerable weld-schedule latitude. Stocking of resistors with two different lead materials is unnecessary.

DURABLE COLOR CODING — Baked-on color code paints are resistant to solvents, and also resist the abrasion and chipping associated with automatic handling. They remain bright and easily readable even after long periods of use.

TEMPERATURE STABLE — Between 0°C and 85°C, A-B hot-molded resistors exhibit a very low temperature characteristic, typically less than two percent deviation from room temperature values, less in low resistance values.

GENERAL CHARACTERISTICS

All measurements made at room temperature except during Temperature Characteristics Test and Load Life Test.

For specific conditions such as mounting, test procedures, sequence of tests, etc., refer to Allen-Bradley Publication 5050. Applicable test procedure numbers are listed in brackets [] below.

Characteristics		Hot-Molded Fixed Resistors				
		¼ Watt Type BB	¼ Watt Type CB	½ Watt Type EB	1 Watt Type GB	2 Watt Type HB
Nominal Resistance Range Standard EIA & MIL (See table on Page 11)		2.7 ohms to 100 megohms	2.7 ohms to 100 megohms	1.0 ohm to 100 megohms	2.7 ohms to 100 megohms	10 ohms to 100 megohms
Standard Tolerances		± 5%, ± 10%, ± 20%	± 5%, ± 10%, ± 20%	± 5%, ± 10%, ± 20%	± 5%, ± 10%, ± 20%	± 5%, ± 10%, ± 20%
Power Rating Maximum continuous rated watts at 70°C ambient based on Load Life Test [6.12]		0.125 watt	0.25 watt	0.5 watt	1.0 watt	2.0 watts
Rated Continuous Working Voltage (RCWV) Based on nominal resistance (R) in ohms.		$\sqrt{0.125 \times R}$ or 150 volts, whichever is less.	$\sqrt{0.25 \times R}$ or 250 volts, whichever is less.	$\sqrt{0.5 \times R}$ or 350 volts, whichever is less.	$\sqrt{1.0 \times R}$ or 500 volts, whichever is less.	$\sqrt{2.0 \times R}$ or 750 volts, whichever is less.
Maximum Ambient Temperature Power rating derated linearly to zero at this temperature		+ 130°C	+ 150°C	+ 150°C	+ 150°C	+ 150°C
Weight (Approximate)	Resistor with nominal length leads	0.077 gm	0.28 gm	0.61 gm	1.45 gm	2.80 gm
	Leads (per millimeter)	1,2 mg/mm	2,9 mg/mm	5,0 mg/mm	8,0 mg/mm	9,4 mg/mm

PERFORMANCE CHARACTERISTICS

Characteristics		Hot-Molded Fixed Resistors				
		¼ Watt Type BB	¼ Watt Type CB	½ Watt Type EB	1 Watt Type GB	2 Watt Type HB
Insulation Resistance [6.6] Minimum		10,000 megohms	10,000 megohms	10,000 megohms	10,000 megohms	10,000 megohms
Dielectric Withstanding Voltage [6.5]	@ Sea Level Atmospheric Press.	300 volts	500 volts	700 volts	1000 volts	1500 volts
	@ 3.4" (86,36 mm) Hg (Simulated 50,000 ft. [15240 meters])	200 volts	325 volts	450 volts	625 volts	625 volts
Resistance-Voltage Coefficient [6.4] Maximum instantaneous change in resistance per volt based on ΔR for ΔV of (1.0 - 0.1) RCWV. Nominal Resistance		10K	-0.020%/volt	-0.015%/volt	-0.010%/volt	-0.007%/volt
		100K	-0.030	-0.020	-0.015	-0.012
		1 Meg	-0.045	-0.025	-0.020	-0.015
		10 Meg	-0.050	-0.030	-0.030	-0.020
		22 Meg	-0.050	-0.035	-0.035	-0.020
		100 Meg	-0.055	-0.035	-0.035	-0.025
Load Life [6.12] 1000 hours operating at RCWV at 70°C ambient for duty cycle of 1½ hour "on", ½ hour "off". Permanent resistance change.	Maximum	+ 4% - 6%	+ 4% - 6%	+ 4% - 6%	+ 4% - 6%	+ 4% - 6%
	Typical	- 3%	- 3%	- 3%	- 3%	- 3%
Load Life (temperature-derated) 1000 hours (1½ hour "on", ½ hour "off") at RCWV derated per temperature according to chart on Page 4. Tested at temperatures between 70°C and maximum ambient temperature. Permanent resistance change. [6.12 modified with respect to voltage applied, as described above.]	Maximum	+ 4% - 6%	+ 4% - 6%	+ 4% - 6%	+ 4% - 6%	+ 4% - 6%
	Typical	- 4%	- 4%	- 4%	- 4%	- 4%
Short-Time Overload [6.11] 5 seconds at 2½ times RCWV; voltage limit as stated. Maximum permanent resistance change.	Voltage Limit	200 volts	400 volts	700 volts	1000 volts	1000 volts
	Maximum	± (2.5% + 0.05 ohm)	± (2% + 0.05 ohm)	± (1% + 0.05 ohm)	± (1% + 0.05 ohm)	± (1% + 0.05 ohm)
	Typical	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%	+ 0.5%

PERFORMANCE CHARACTERISTICS

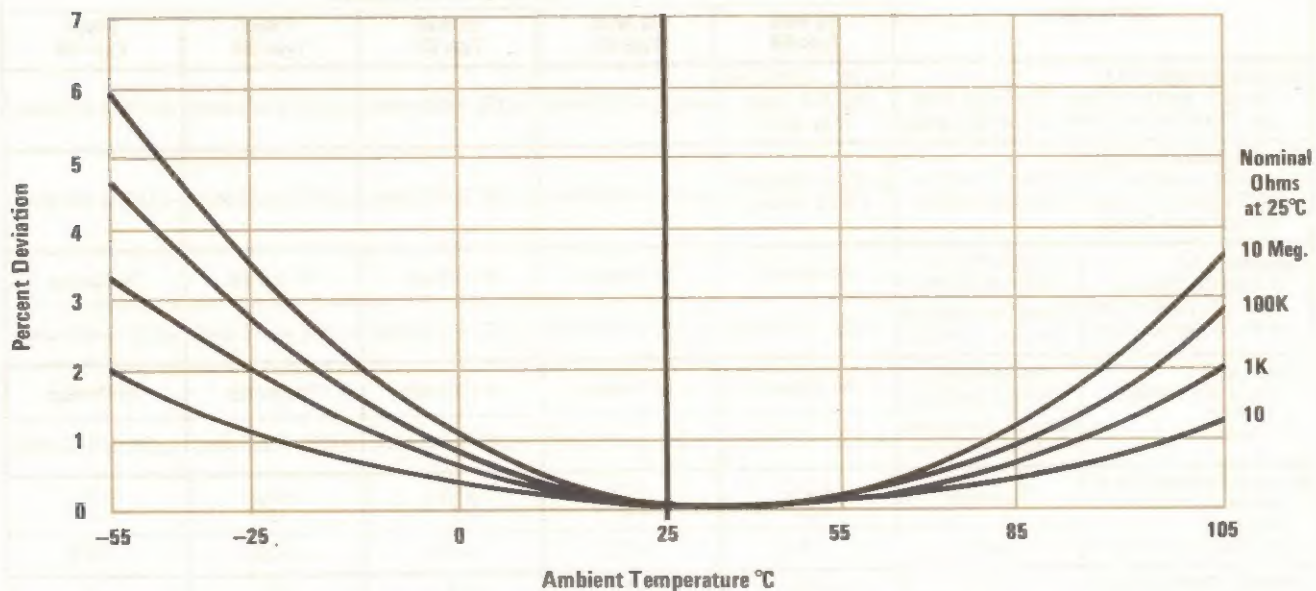
Characteristics			Hot-Molded Fixed Resistors				
			¼ Watt Type BB	¼ Watt Type CB	½ Watt Type EB	1 Watt Type GB	2 Watt Type HB
Terminal Strength [6.13] 5 lb. (2.27 Kgm) Pull Test. Three turn Twist Test. Maximum permanent resistance change.			±(1% +0.05 ohm) (2lb. Pull Test) (0.91 Kgm)	±(1% +0.05 ohm)	±(1% +0.05 ohm)	±(1% +0.05 ohm)	±(1% +0.05 ohm)
Effect of Solder Heat [6.14] Leads immersed to .125" (3,18 mm) of body in 350°C solder for 3 seconds. Maximum permanent resistance change.			±(2% +0.05 ohm) (250°C Solder)	±(2% +0.05 ohm)	±(3% +0.05 ohm)	±(3% +0.05 ohm)	±(3% +0.05 ohm)
Vibration [6.17] 10-2000 Hz, 0.06 inch (1,52 mm) peak-to-peak or 20G, whichever is less.	Mechanical or Electrical Damage		No Damage	No Damage	No Damage	No Damage	No Damage
	Maximum Permanent Resistance Change		±(1% +0.05 ohm)	±(1% +0.05 ohm)	±(1% +0.05 ohm)	±(1% +0.05 ohm)	±(1% +0.05 ohm)
Shock [6.16] 100g, 6 ms, sawtooth, 10 shocks, 2 planes.	Mechanical or Electrical Damage		No Damage	No Damage	No Damage	No Damage	No Damage
	Maximum Permanent Resistance Change		±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)
Moisture Resistance [6.9] Temporary resistance change See comment on Page 6	Maximum		+15% -0%	+12% -0%	+14% -0%	+8% -0%	+7% -0%
	Typical		+9%	+6%	+7%	+5%	+4%
Humidity Characteristic (steady state) [6.10] 240 hours @ +40°C and 95% relative humidity. Temporary resistance change. Nominal Resistance (ohms)	10	Maximum	+8% -0%	+5% -0%	+4% -0%	+3% -0%	+3% -0%
		Typical	+4%	+3%	+2%	+2%	+1%
	1000	Maximum	+9% -0%	+6% -0%	+6% -0%	+4% -0%	+4% -0%
		Typical	+5%	+4%	+4%	+2%	+2%
	100K	Maximum	+11% -0%	+9% -0%	+8% -0%	+5% -0%	+5% -0%
		Typical	+8%	+6%	+6%	+3%	+2.5%
	10 Meg. and 100 Meg.	Maximum	+13% -0%	+10% -0%	+9% -0%	+5% -0%	+5% -0%
		Typical	+9%	+8%	+7%	+3%	+2.5%
Low Temperature Operation [6.7] After 1 hour @ -65, +0 -5°C, apply RCWV for 45 minutes. Remove RCWV, return to room temperature. Resistance change measured 24 hours after test.	Maximum		±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)
	Typical		+0.5%	+0.5%	+0.5%	+0.5%	+0.5%
Temperature Cycling [6.8] Limits: -55°C and +85°C Resistance change after five cycles	Maximum		±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)	±(2% +0.05 ohm)
	Typical		+0.5%	+0.5%	+0.5%	+0.5%	+0.5%

TEMPERATURE CHARACTERISTICS

In addition to the maximum values given in this table, typical curves of temporary resistance change due to temperature are illustrated at the top of the next page.

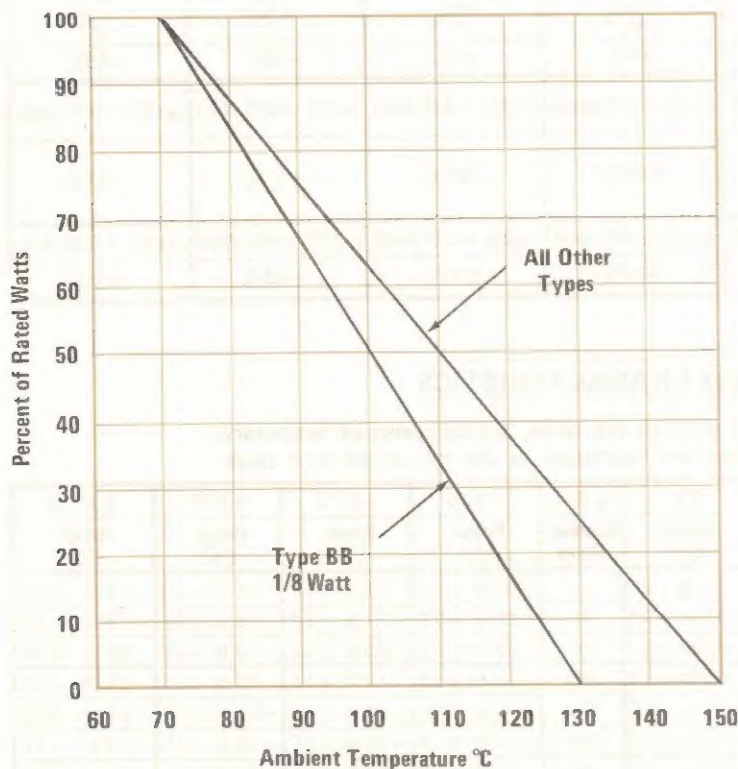
Resistance-Temperature Characteristic [6.3]	-55°C	-25°C	-15°C	0°C	+25°C	+55°C	+65°C	+85°C	+105°C
	Range (%)	Range (%)	Range (%)	Range (%)	Nominal Ohms	Range (%)	Range (%)	Range (%)	Range (%)
Maximum temporary resistance change from the +25°C initial resistance value. Note—Linear interpolation approximates intermediate values.	+0.2 to +2.6	-0.2 to +1.3	-0.2 to +1.0	-0.2 to +0.6	1	-0.4 to +0.5	-0.5 to +0.7	-0.5 to +1.3	-0.4 to +2.0
	+0.2 to +3.8	-0.3 to +2.0	-0.3 to +1.5	-0.3 to +0.9	10	-0.6 to +0.8	-0.7 to +1.1	-0.8 to +2.0	-0.6 to +3.0
	+0.3 to +5.1	-0.3 to +2.7	-0.4 to +2.0	-0.4 to +1.1	100	-0.8 to +1.0	-0.9 to +1.5	-1.0 to +2.6	-0.8 to +4.0
	+0.3 to +6.4	-0.4 to +3.4	-0.5 to +2.5	-0.5 to +1.4	1000	-1.0 to +1.3	-1.2 to +1.8	-1.3 to +3.3	-1.0 to +5.0
	+0.4 to +7.7	-0.5 to +4.0	-0.6 to +3.0	-0.6 to +1.7	10K	-1.2 to +1.5	-1.4 to +2.2	-1.5 to +3.9	-1.2 to +6.0
	+0.5 to +8.9	-0.6 to +4.7	-0.7 to +3.5	-0.7 to +2.0	100K	-1.4 to +1.8	-1.6 to +2.6	-1.8 to +4.6	-1.4 to +7.1
	+0.5 to +10.2	-0.7 to +5.4	-0.9 to +4.0	-0.8 to +2.3	1 Meg	-1.6 to +2.0	-1.9 to +3.0	-2.0 to +5.2	-1.6 to +8.1
	+0.6 to +11.5	-0.8 to +6.0	-0.9 to +4.5	-0.9 to +2.6	10 Meg	-1.8 to +2.3	-2.1 to +3.3	-2.3 to +5.9	-1.8 to +9.1
	+0.6 to +11.9	-0.8 to +6.3	-0.9 to +4.7	-0.9 to +2.6	22 Meg	-1.9 to +2.4	-2.2 to +3.5	-2.4 to +6.1	-1.9 to +9.4
	+0.7 to +12.8	-0.8 to +6.7	-1.0 to +5.0	-0.9 to +2.8	100 Meg	-2.0 to +2.5	-2.4 to +3.7	-2.5 to +6.6	-2.0 to +10.1

TYPICAL RESISTANCE – TEMPERATURE CHARACTERISTICS



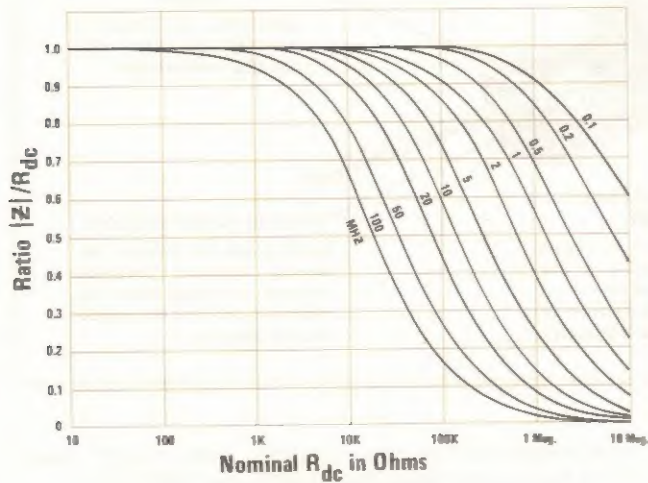
Percent Resistance Deviation From 25°C Value for Various Nominal Resistance Values and Temperatures.

DERATING WITH RESPECT TO AMBIENT TEMPERATURE

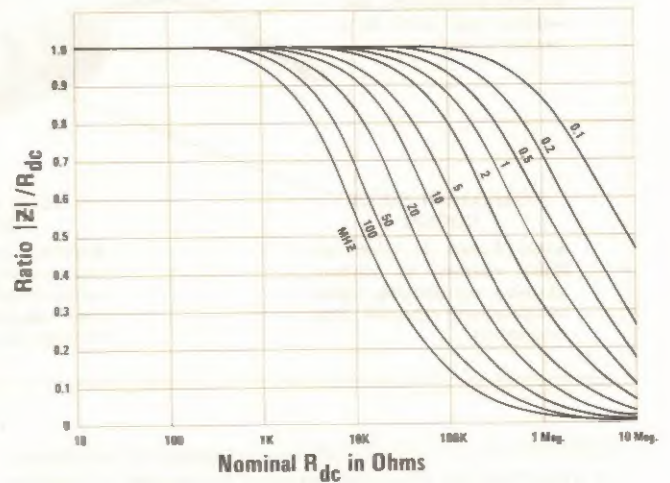


DERATING – For resistors operated in ambient temperatures above 70°C, the change in resistance after 1000 hours under conditions similar to the Load Life Test will be less than +4% to -6% when the load wattage is derated in accordance with the curve shown. The most significant factor in proper derating to achieve minimal permanent resistance change over long periods of operation is the resultant surface temperature of the resistor. (See note 7 under Application Information).

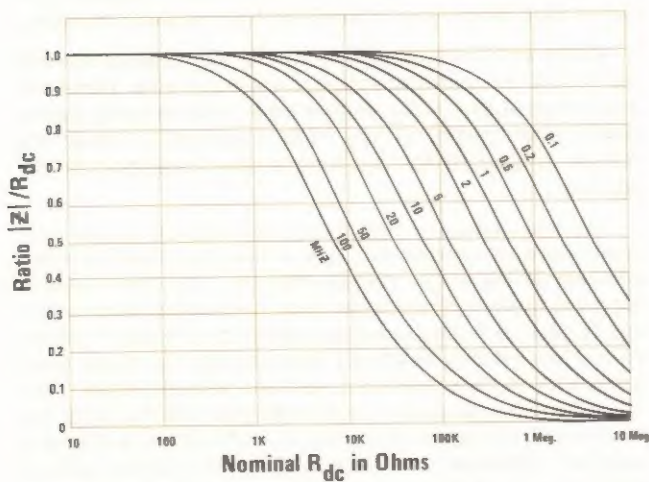
TYPICAL HIGH FREQUENCY CHARACTERISTICS



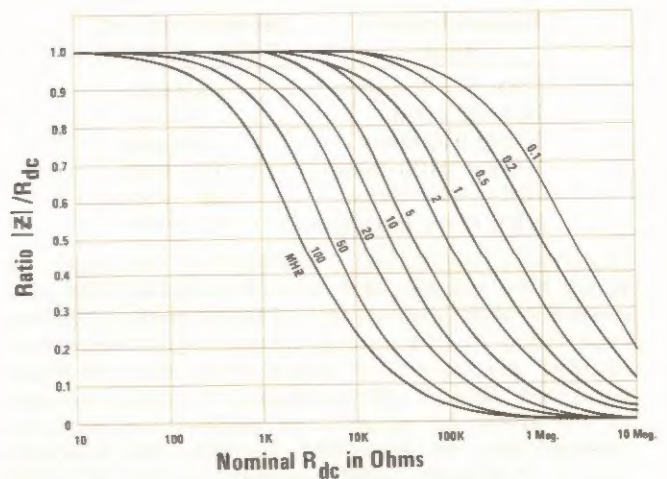
1/8 Watt Type BB
1/4 Watt Type CB



1/2 Watt Type EB

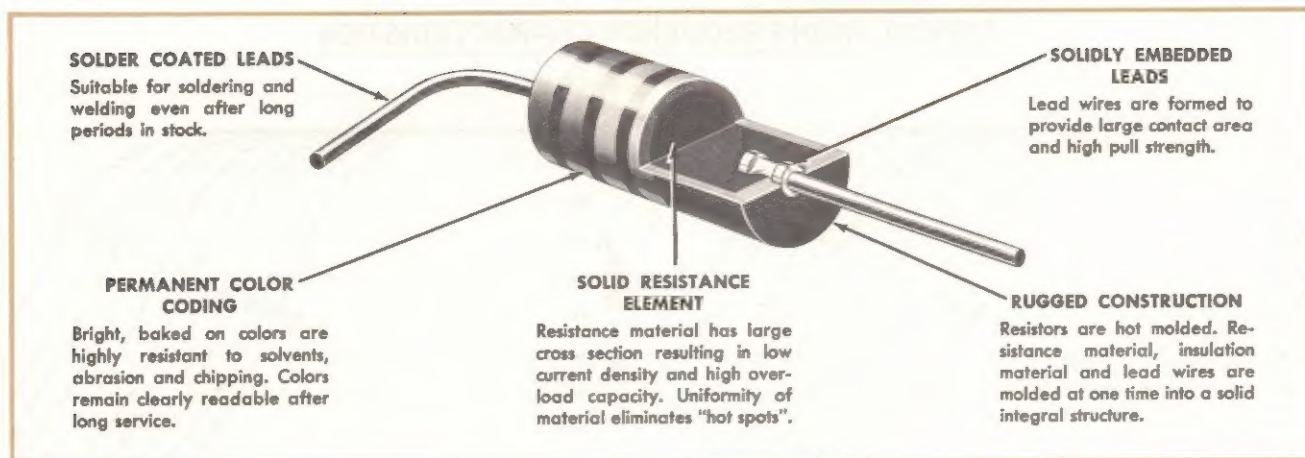


1 Watt Type GB



2 Watt Type HB

MEASUREMENT CONDITIONS — The curves above give typical values of impedance to DC resistance ratio from 100 KHz to 100 MHz. Care was taken in test fixture design to prevent distributed capacitance to ground along the length of the resistor from contributing to measured values. Lead length was held at one quarter inch to standardize the lead inductance contribution. User's circuit variations from test conditions in mounting position and lead length can have a significant effect on the high frequency characteristics.



RESISTOR TEST VOLTAGES — In measuring resistance, it is important to take into account the effects of heating due to voltage application and the "offset" of resistance due to its voltage coefficient. Maximum voltage coefficients are listed on Page 2 of this publication. The voltage used should be applied for as short a time as possible, to minimize the effect of heating. For reference purposes, the voltages listed below should be used.

Nominal Resistance Range	Recommended Test Voltage (DC Volts)
1.0 to 9.1 ohms	0.3 volt
10 to 91 ohms	1.0 volt
100 to 910 ohms	3.0 volts
1000 to 9100 ohms	10 volts
10K to 91K ohms	30 volts
100K ohms and higher	100 volts

MOISTURE RESISTANCE TESTING — The results obtained from this test, defined in Publication 5050 paragraph 6.9 which parallels MIL-STD-202 Method 106 have been found to vary because of the involved equipment required, the inclusion of several destructive-type procedures, and the poor reproducibility of the test. Isolation of the effects of moisture on resistors can be better achieved using the Steady State Humidity Test, paragraph 6.10 in Publication 5050, paralleled by MIL-STD-202, Method 103. Maximum and typical values of resistance change for both tests are shown in the table on Page 3 of this publication.

SOLDERABILITY — Allen-Bradley hot-molded fixed resistors meet the solderability requirements of MIL-R-39008 and MIL-STD-202, Method 208.

RESISTANCE TO SOLVENTS — The color code remains legible after resistors are subjected to the Resistance To Solvents test of MIL-STD-202, Method 215. Also, the resistors will withstand the Color Code Solvent Resistance test described in Paragraph 6.20 of Publication 5050, which includes ultrasonically agitated liquids at elevated temperature.

MILITARY QUALIFICATION — The Allen-Bradley hot-molded fixed resistors meet or exceed all applicable military specifications including MIL-R-39008, Resistors, Fixed, Composition (Insulated), Established Reliability, and are fully qualified in all wattage sizes and all resis-

tance values to the best reliability level, the "S" level, with a failure rate lower than 0.001% per 1000 hours.

RESISTANCE MEASURING TECHNIQUES — Measured resistance value is dependent upon the resistor temperature, the test voltage, and the degree of resistor dryness. Accurate correlation between repeated measurements, especially at different times, and different locations, requires that these three conditions be essentially the same.

Slight variations in resistor body temperature are not significant in room temperature measurements. However, the temperature of the resistor body may increase appreciably when tested at too high a voltage or when the voltage is applied for too long a time causing excessive heating.

The test voltage is very important and sometimes misunderstood or overlooked. This is because a tester is often unaware of the actual voltage that the instrument used is applying to the resistor under test. Commonly used instruments such as highly accurate resistance bridges or digital voltmeters employ relatively low voltages to make measurements, usually around 1 volt and seldom higher than 10 volts. This does not cause significant differences for low resistance values where the use of low test voltages is specified. However, for higher resistance values such as 100K ohms or higher, a test voltage of 90 or 100 volts is specified and use of a low voltage test instrument will result in substantial difference in readings.

It is important to recognize that apparent out-of-tolerance on the + side can be caused by excessive moisture, and when such a condition is observed the test sample should then be conditioned in a dry oven as described in Publication 5050.

Since both moisture and too low test voltages make the resistance value appear higher than when tested under standard conditions, it can be easily seen how these two effects when combined together may produce a significant measurement difference.

OTHER A-B HOT-MOLDED RESISTOR PUBLICATIONS — **Resistor Test Procedures** — Publication 5050 covers resistor test procedures and contains a cross index of Allen-Bradley resistor test methods and the equivalent or near-equivalent methods specified in MIL-R-11, MIL-R-39008, MIL-STD-202 and EIA Specification RS-186.

METAL CLAD FIXED RESISTORS

The Allen-Bradley Type GM and HM resistors are insulated Type GB and HB fixed composition resistors fitted with metal clamps which surround the major portion of the resistor. The metal clamps provide rigid mounting and efficient heat transfer from the resistors to the metal chassis or panels on which they are mounted.

It has been well established that Allen-Bradley fixed composition resistors exhibit superior reliability. When used according to published ratings and recommendations they do not open circuit nor exhibit large erratic changes of resistance value. The standard units are available up to and including 2 watt ratings.

Type GM and HM resistors make this same reliable performance AVAILABLE UP TO AND INCLUDING 5 WATTS.

PERFORMANCE CHARACTERISTICS — The performance characteristics for Types GM and HM are the same as for Types GB and HB respectively, as shown in the tables on pages 2 and 3, with the following exceptions.

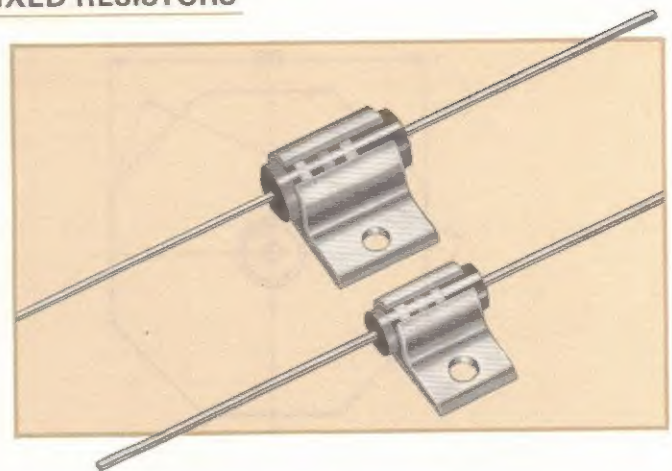
Nominal Resistance Range —

Type GM — 2.7 ohms to 22 megohms
Type HM — 10 ohms to 22 megohms

Standard Tolerances — $\pm 5\%$, $\pm 10\%$

Power Rating — When mounted on the equivalent of a steel panel 4 inches (101.60 mm) square and 0.05 inch (1.27 mm) thick

Type	70°C Ambient	40°C Ambient
GM	3 watts	4 watts
HM	4 watts	5 watts



Rated Continuous Working Voltage (RCWV) —

Type GM $\sqrt{3.0 \times R}$ or 500 volts, whichever is less
Type HM $\sqrt{4.0 \times R}$ or 750 volts, whichever is less

Weight — Approximate, with nominal length leads

Type GM 4.7 gm
Type HM 8.0 gm

Insulation Resistance — 100,000 megohms minimum between resistor leads and metal clamp

Dielectric Withstanding Voltage — At sea level, 1500 volts

Short Time Overload — $\pm(2.5\% + 0.05 \text{ ohm})$, maximum

Capacitance — between resistor leads and metal clamp

Type GM 5.6 pF, approximately
Type HM 9.0 pF, approximately

REEL PACKAGED RESISTORS

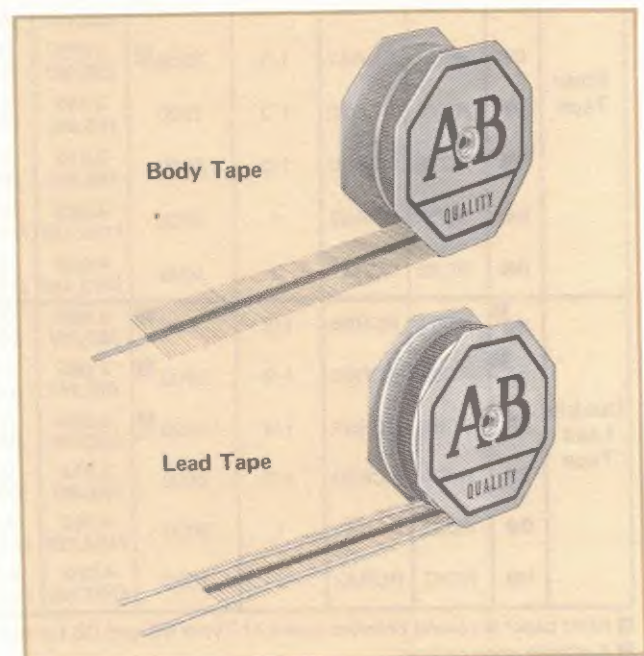
REEL PACKAGED — Allen-Bradley hot-molded fixed resistors may be obtained reel packaged for use directly on automatic assembly equipment.

36-INCH LEADER — A minimum of 36 inches (914.40 mm) of free tape are provided at each end of the reel for splicing purposes on lead tape reels. For body tape, a 12-inch (30.48 mm) leader at the core and a 36-inch (914.40 mm) leader on the outside end.

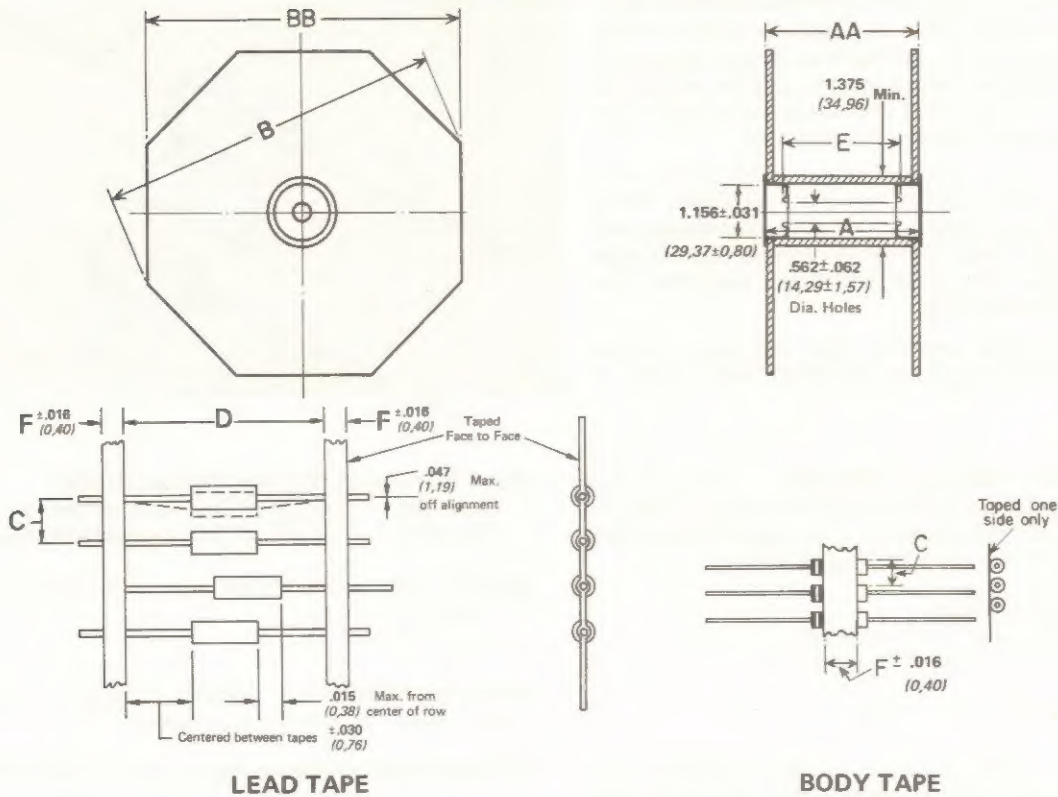
HEAVY DUTY REEL CONSTRUCTION — The octagonal reels are made from corrugated fiberboard sides glued to a heavy fiberwound core. The reel is provided with metal bearings having a .562 inch (14.29 mm) hole.

EXPENDABLE — Since these reels are intended to be used as one-time dispensers of resistors, there are no storage problems, no returns.

Note: Long term storage of adhesive taped reel-packaged resistors is not recommended due to normal adhesive aging.



REEL PACKAGING DIMENSIONS



LEAD TAPE

BODY TAPE

	A-B Type	MIL-R-11 Style	MIL-R-39008 Style	Rating (Watts)	Standard Quantity (per reel)	Across Hubs	Across Flanges	Across Points	Across Flats	Resistor Spacing	Tape Spacing	Between Hub Holes	Tape Width
						A Max. (in.)	AA Approx. (in.)	B Max. (in.)	BB Max. (in.)	C (in.)	D (in.) $\pm .062$ (1,59)	E Approx. (in.)	F (in.)
Body Tape	BB	RC05	RCR05	1/8	1000 ¹	2.468 (62,69)	2.406 (61,12)	4.062 (103,19)	3.750 (95,25)	.076 max. (1,93)		1.593 (40,46)	.125 (3,18)
	BB	RC05	RCR05	1/8	4000 ¹	2.468 (62,69)	2.406 (61,12)	6.500 (165,10)	6.000 (152,40)	.076 max. (1,93)		1.593 (40,46)	.125 (3,18)
	CB	RC07	RCR07	1/4	2500 ¹	3.625 (92,08)	3.562 (90,49)	6.500 (165,10)	6.000 (152,40)	.120 max. (3,05)		2.750 (69,85)	.188 (4,76)
	EB	RC20	RCR20	1/2	2500	3.812 (96,84)	3.750 (95,25)	9.750 (247,65)	9.000 (228,60)	.170 max. (4,32)		2.938 (74,61)	.250 (6,35)
	EB	RC20	RCR20	1/2	5000	3.812 (96,84)	3.750 (95,25)	13.188 (334,96)	12.188 (309,56)	.170 max. (4,32)		2.938 (74,61)	.250 (6,35)
	GB	RC32	RCR32	1	2000	4.062 (103,19)	4.000 (101,60)	13.188 (334,96)	12.188 (309,56)	.270 max. (6,86)		3.188 (80,96)	.375 (9,53)
	HB	RC42	RCR42	2	1000	4.062 (103,19)	4.000 (101,60)	13.188 (334,96)	12.188 (309,56)	.385 max. (9,78)		3.188 (80,96)	.375 (9,53)
Double Lead Tape	BB ²	RC05	RCR05	1/8	500 ¹	2.688 (68,26)	2.625 (66,68)	4.062 (103,19)	3.750 (95,25)	.200 \pm .015 (5,08 \pm 0,38)	1.812 (46,04)	1.812 (46,04)	.250 (6,35)
	BB ²	RC05	RCR05	1/8	2000 ¹	2.688 (68,26)	2.625 (66,68)	6.500 (165,10)	6.000 (152,40)	.200 \pm .015 (5,08 \pm 0,38)	1.812 (46,04)	1.812 (46,04)	.250 (6,35)
	CB	RC07	RCR07	1/4	2500 ¹	3.625 (92,08)	3.562 (90,49)	9.750 (247,65)	9.000 (228,60)	.200 \pm .015 (5,08 \pm 0,38)	2.062 (52,39)	2.750 (69,85)	.250 (6,35)
	EB	RC20	RCR20	1/2	2500	3.812 (96,84)	3.750 (95,25)	9.750 (247,65)	9.000 (228,60)	.200 \pm .015 (5,08 \pm 0,38)	2.062 (52,39)	2.938 (74,61)	.250 (6,35)
	GB	RC32	RCR32	1	2000	4.062 (103,19)	4.000 (101,60)	13.188 (334,96)	12.188 (309,56)	.375 \pm .015 (9,53 \pm 0,38)	2.875 (73,03)	3.188 (80,96)	.250 (6,35)
	HB	RC42	RCR42	2	1000	4.062 (103,19)	4.000 (101,60)	13.188 (334,96)	12.188 (309,56)	.375 \pm .015 (9,53 \pm 0,38)	2.875 (73,03)	3.188 (80,96)	.250 (6,35)

¹ Kraft paper is wound between layers of Types BB and CB for full length of tape.

² Available upon request.

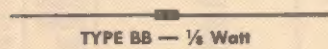
Note: Dimensions shown in *Italics* are in Millimeters.

APPLICATION INFORMATION

The following information has been compiled to aid in the everyday selection and application of Allen-Bradley hot-molded resistors. The statements on this page should be helpful in evaluating the use of all types of A-B hot-molded resistors in broad general terms, and are not to be interpreted as precise. A comprehensive list is made of the

standard nominal resistance values in their available tolerance categories, the rated continuous working voltages for all hot-molded types, the part numbers, and color codes — all information provided for all values from 1 ohm to 100 megohms, taking into account the available range of values for each type as of the date of this publication.

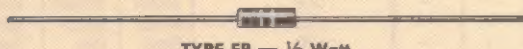
GENERAL PURPOSE RESISTORS



TYPE BB — 1/4 Watt



TYPE CB — 1/4 Watt



TYPE EB — 1/2 Watt



TYPE GB — 1 Watt



TYPE HB — 2 Watt

METAL CLAD RESISTORS



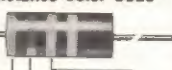
TYPE GM — 3 Watt @ 70° C, 4 Watt @ 40° C



TYPE HM — 4 Watt @ 70° C, 5 Watt @ 40° C

1. Low-value resistors exhibit less change due to humidity, temperature and voltage than high-value resistors.
2. Resistance changes due to increase in moisture content are always positive.
3. Resistance changes due to humidity are temporary, and, in the case of Allen-Bradley resistors, are reversible.
4. Change of resistance which has occurred due to humidity may be essentially eliminated by conditioning the resistor at 100°C or by dry storage.
5. The effects of humidity may be minimized by operating the resistor with as little as 1/10 rated wattage load.
6. Resistance change due to load life is permanent and ultimately negative.
7. Resistance change due to load life can be minimized — 1% to 2% in many thousands of hours by 50% derating. This same result can be attained by limiting the maximum operating surface temperature of the resistor under load to 100°C. Permanent resistance changes as the result of storage at temperatures below 100°C are negligible, even for extended time periods.
8. Resistance change due to soldering is positive and may be permanent if the resistor has moisture present in its body. It can be greatly minimized if resistors are dry at the time of soldering.
9. The temperature characteristic of Allen-Bradley resistors is positive above +80° and below -10°C.
10. The temperature characteristic of the Allen-Bradley resistor is negligible from -10°C to +80°C.
11. The voltage characteristic (negative) and the temperature characteristic (positive) tend to cancel one another in an Allen-Bradley resistor under average operating conditions, where both significant voltage and elevated temperature are present.
12. The heat sink to which a resistor is connected affects its rating. Resistors operated in multiple should be derated unless adequate heat sinks are provided.
13. The quality and reliability of Allen-Bradley resistors is the same for, and independent of, any resistance tolerances shown on the resistor.

STANDARD RESISTANCE VALUES


Nominal Resistance in Ohms			Rated Continuous Working Voltage (RCWV) DC or RMS Volts										Resistor Part Number			Resistance Color Code		
TOLERANCE COLOR CODE			WATTAGE and TYPE										Type BB CB EB etc. XX	Value Code 000	Toler- ance 5=5% 1=10% 2=20% X			
4th BAND			1/8 1	1/4 2	1/2 2	1 2	2 2	3 2	4 3	4 2	5 3	1st BAND				2nd BAND	3rd BAND	
Gold ±5%	Silver ±10%	None ±20%	BB	CB	EB	GB	HB	GM	GM	HM	HM	1st digit				2nd digit	Number of zeros after 1st & 2nd digit	
1.0	1.0	1.0	—	—	0.707	—	—	—	—	—	—	10G	Brown	Black	Gold			
1.1	—	—	—	—	0.742	—	—	—	—	—	—	11G	Brown	Brown	Gold			
1.2	1.2	—	—	—	0.775	—	—	—	—	—	—	12G	Brown	Red	Gold			
1.3	—	—	—	—	0.806	—	—	—	—	—	—	13G	Brown	Orange	Gold			
1.5	1.5	1.5	—	—	0.866	—	—	—	—	—	—	15G	Brown	Green	Gold			
1.6	—	—	—	—	0.894	—	—	—	—	—	—	16G	Brown	Blue	Gold			
1.8	1.8	—	—	—	0.949	—	—	—	—	—	—	18G	Brown	Gray	Gold			
2.0	—	—	—	—	1.00	—	—	—	—	—	—	20G	Red	Black	Gold			
2.2	2.2	2.2	—	—	1.05	—	—	—	—	—	—	22G	Red	Red	Gold			
2.4	—	—	—	—	1.10	—	—	—	—	—	—	24G	Red	Yellow	Gold			
2.7	2.7	—	0.581	0.822	1.16	1.64	—	2.85	3.29	—	—	27G	Red	Violet	Gold			
3.0	—	—	0.612	0.866	1.22	1.73	—	3.00	3.46	—	—	30G	Orange	Black	Gold			
3.3	3.3	3.3	0.642	0.908	1.28	1.82	—	3.15	3.63	—	—	33G	Orange	Orange	Gold			
3.6	—	—	0.671	0.949	1.34	1.90	—	3.29	3.79	—	—	36G	Orange	Blue	Gold			
3.9	3.9	—	0.698	0.987	1.40	1.97	—	3.42	3.95	—	—	39G	Orange	White	Gold			
4.3	—	—	0.733	1.04	1.47	2.07	—	3.59	4.15	—	—	43G	Yellow	Orange	Gold			
4.7	4.7	4.7	0.766	1.08	1.53	2.17	—	3.76	4.34	—	—	47G	Yellow	Violet	Gold			
5.1	—	—	0.798	1.13	1.60	2.26	—	3.91	4.52	—	—	51G	Green	Brown	Gold			
5.6	5.6	—	0.837	1.18	1.67	2.37	—	4.10	4.73	—	—	56G	Green	Blue	Gold			
6.2	—	—	0.880	1.24	1.76	2.49	—	4.31	4.98	—	—	62G	Blue	Red	Gold			
6.8	6.8	6.8	0.922	1.30	1.84	2.61	—	4.52	5.22	—	—	68G	Blue	Gray	Gold			
7.5	—	—	0.968	1.37	1.94	2.74	—	4.74	5.48	—	—	75G	Violet	Green	Gold			
8.2	8.2	—	1.01	1.43	2.02	2.86	—	4.96	5.73	—	—	82G	Gray	Red	Gold			
9.1	—	—	1.07	1.51	2.13	3.02	—	5.22	6.03	—	—	91G	White	Brown	Gold			
10	10	10	1.12	1.58	2.24	3.16	4.47	5.48	6.32	6.32	7.07	100	White	Black	Black			
11	—	—	1.17	1.66	2.34	3.32	4.69	5.74	6.63	6.63	7.42	110	Brown	Brown	Black			
12	12	—	1.22	1.73	2.45	3.46	4.90	6.00	6.93	6.93	7.75	120	Brown	Red	Black			
13	—	—	1.28	1.80	2.55	3.61	5.10	6.24	7.21	7.21	8.06	130	Brown	Orange	Black			
15	15	15	1.37	1.94	2.74	3.87	5.48	6.71	7.75	7.75	8.66	150	Brown	Green	Black			
16	—	—	1.41	2.00	2.83	4.00	5.66	6.93	8.00	8.00	8.94	160	Brown	Blue	Black			
18	18	—	1.50	2.12	3.00	4.24	6.00	7.35	8.48	8.48	9.49	180	Brown	Gray	Black			
20	—	—	1.58	2.24	3.16	4.47	6.32	7.75	8.94	8.94	10.0	200	Red	Black	Black			
22	22	22	1.66	2.34	3.32	4.69	6.63	8.12	9.38	9.38	10.5	220	Red	Red	Black			
24	—	—	1.73	2.45	3.46	4.90	6.93	8.48	9.80	9.80	11.0	240	Red	Yellow	Black			
27	27	—	1.84	2.60	3.67	5.20	7.35	9.00	10.4	10.4	11.6	270	Red	Violet	Black			
30	—	—	1.94	2.74	3.87	5.48	7.75	9.49	11.0	11.0	12.2	300	Orange	Black	Black			
33	33	33	2.03	2.87	4.06	5.74	8.12	9.95	11.5	11.5	12.8	330	Orange	Orange	Black			
36	—	—	2.12	3.00	4.24	6.00	8.48	10.4	12.0	12.0	13.4	360	Orange	Blue	Black			
39	39	—	2.21	3.12	4.42	6.24	8.83	10.8	12.5	12.5	14.0	390	Orange	White	Black			
43	—	—	2.32	3.28	4.64	6.56	9.27	11.4	13.1	13.1	14.7	430	Orange	Orange	Black			
47	47	47	2.42	3.43	4.85	6.86	9.70	11.9	13.7	13.7	15.3	470	Yellow	Violet	Black			
51	—	—	2.52	3.57	5.05	7.14	10.1	12.4	14.3	14.3	16.0	510	Green	Brown	Black			
56	56	—	2.65	3.74	5.29	7.48	10.6	13.0	15.0	15.0	16.7	560	Green	Blue	Black			
62	—	—	2.78	3.94	5.57	7.87	11.1	13.6	15.7	15.7	17.6	620	Blue	Red	Black			
68	68	68	2.92	4.12	5.83	8.25	11.7	14.3	16.5	16.5	18.4	680	Blue	Gray	Black			
75	—	—	3.06	4.33	6.12	8.66	12.2	15.0	17.3	17.3	19.4	750	Violet	Green	Black			
82	82	—	3.20	4.53	6.40	9.06	12.8	15.7	18.1	18.1	20.2	820	Gray	Red	Black			
91	—	—	3.37	4.77	6.74	9.54	13.5	16.5	19.1	19.1	21.3	910	White	Brown	Black			
100	100	100	3.54	5.00	7.07	10.0	14.1	17.3	20.0	20.0	22.4	101	Brown	Black	Brown			
110	—	—	3.71	5.24	7.42	10.5	14.8	18.2	21.0	21.0	23.5	111	Brown	Brown	Brown			
120	120	—	3.87	5.48	7.75	11.0	15.5	19.0	21.9	21.9	24.5	121	Brown	Red	Brown			
130	—	—	4.03	5.70	8.06	11.4	16.1	19.7	22.8	22.8	25.5	131	Brown	Orange	Brown			
150	150	150	4.33	6.12	8.66	12.2	17.3	21.2	24.5	24.5	27.4	151	Brown	Green	Brown			
160	—	—	4.47	6.32	8.94	12.6	17.9	21.9	25.3	25.3	28.3	161	Brown	Blue	Brown			
180	180	—	4.74	6.71	9.49	13.4	19.0	23.2	26.8	26.8	30.0	181	Brown	Gray	Brown			
200	—	—	5.00	7.07	10.0	14.1	20.0	24.5	28.3	28.3	31.6	201	Red	Black	Brown			
220	220	220	5.24	7.42	10.5	14.8	21.0	25.7	29.7	29.7	33.2	221	Red	Red	Brown			
240	—	—	5.48	7.75	11.0	15.5	21.9	26.8	31.0	31.0	34.6	241	Red	Yellow	Brown			
270	270	—	5.81	8.22	11.6	16.4	23.2	28.5	32.9	32.9	36.7	271	Red	Violet	Brown			
300	—	—	6.12	8.66	12.2	17.3	24.5	30.0	34.6	34.6	38.7	301	Orange	Black	Brown			
330	330	330	6.42	9.08	12.8	18.2	25.7	31.5	36.3	36.3	40.6	331	Orange	Orange	Brown			
360	—	—	6.71	9.49	13.4	19.0	26.8	32.9	37.9	37.9	42.4	361	Orange	Blue	Brown			
390	390	—	6.98	9.87	14.0	19.7	27.9	34.2	39.5	39.5	44.2	391	Orange	White	Brown			
430	—	—	7.33	10.4	14.7	20.7	29.3	35.9	41.5	41.5	46.4	431	Yellow	Orange	Brown			
470	470	470	7.66	10.8	15.3	21.7	30.7	37.6	43.4	43.4	48.5	471	Yellow	Violet	Brown			

1 Rating @ 70°C, derated to zero @ 130°C.

2 Rating @ 40°C, derated to zero @ 150°C.

3 Rating @ 70°C, derated to zero @ 150°C.

STANDARD RESISTANCE VALUES


Nominal Resistance in Ohms			Rated Continuous Working Voltage (RCWV) DC or RMS Volts										Resistor Part Number			Resistance Color Code		
TOLERANCE COLOR CODE			WATTAGE and TYPE										Type BB CB EB etc. XX	Value Code 000	Toler- ance 5 = 5% 1 = 10% 2 = 20% X			
4th BAND																1st BAND	2nd BAND	3rd BAND
Gold ±5%	Silver ±10%	None ±20%	BB	CB	EB	GB	HB	GM	GM	HM	HM	1st digit				2nd digit	Number of zeros after 1st & 2nd digit	
510	—	—	7.98	11.3	16.0	22.6	31.9	39.1	45.2	45.2	50.5	511	511	511	Green	Brown	Brown	
560	560	—	8.37	11.8	16.7	23.7	33.5	41.0	47.3	47.3	52.9	561	561	561	Green	Blue	Brown	
620	—	—	8.80	12.4	17.6	24.9	35.2	43.1	49.8	49.8	55.7	621	621	621	Blue	Red	Brown	
680	680	680	9.22	13.0	18.4	26.1	36.9	45.2	52.2	52.2	58.3	681	681	681	Blue	Gray	Brown	
750	—	—	9.68	13.7	19.4	27.4	38.7	47.4	54.8	54.8	61.2	751	751	751	Violet	Green	Brown	
820	820	—	10.1	14.3	20.2	28.6	40.5	49.6	57.3	57.3	64.0	821	821	821	Gray	Red	Brown	
910	—	—	10.7	15.1	21.3	30.2	42.7	52.2	60.3	60.3	67.5	911	911	911	White	Brown	Brown	
1000	1000	1000	11.2	15.8	22.4	31.6	44.7	54.8	63.2	63.2	70.7	102	102	102	Brown	Black	Red	
1100	—	—	11.7	16.6	23.4	33.2	46.9	57.4	66.3	66.3	74.2	112	112	112	Brown	Brown	Red	
1200	1200	—	12.2	17.3	24.5	34.6	49.0	60.0	69.3	69.3	77.5	122	122	122	Brown	Red	Red	
1300	—	—	12.8	18.0	25.5	36.1	51.0	62.4	72.1	72.1	80.6	132	132	132	Brown	Orange	Red	
1500	1500	1500	13.7	19.4	27.4	38.7	54.8	67.1	77.5	77.5	86.6	152	152	152	Brown	Green	Red	
1600	—	—	14.1	20.0	28.3	40.0	56.6	69.3	80.0	80.0	89.4	162	162	162	Brown	Blue	Red	
1800	1800	—	15.0	21.2	30.0	42.4	60.0	73.5	84.8	84.8	94.9	182	182	182	Brown	Gray	Red	
2000	—	—	15.8	22.4	31.6	44.7	63.2	77.5	89.4	89.4	100	202	202	202	Red	Black	Red	
2200	2200	2200	16.6	23.4	33.2	46.9	66.3	81.2	93.8	93.8	105	222	222	222	Red	Red	Red	
2400	—	—	17.3	24.5	34.6	49.0	69.3	84.8	98.0	98.0	110	242	242	242	Red	Yellow	Red	
2700	2700	—	18.4	26.0	36.7	52.0	73.5	90.0	104	104	116	272	272	272	Red	Violet	Red	
3000	—	—	19.4	27.4	38.7	54.8	77.5	94.9	110	110	122	302	302	302	Orange	Black	Red	
3300	3300	3300	20.3	28.7	40.6	57.4	81.2	99.5	115	115	128	332	332	332	Orange	Orange	Red	
3600	—	—	21.2	30.0	42.4	60.0	84.8	104	120	120	134	362	362	362	Orange	Blue	Red	
3900	3900	—	22.1	31.2	44.2	62.4	88.3	108	125	125	140	392	392	392	Orange	White	Red	
4300	—	—	23.2	32.8	46.4	65.6	92.7	114	131	131	147	432	432	432	Yellow	Orange	Red	
4700	4700	4700	24.2	34.3	48.5	68.6	97.0	119	137	137	153	472	472	472	Yellow	Violet	Red	
5100	—	—	25.2	35.7	50.5	71.4	101.0	124	143	143	160	512	512	512	Green	Brown	Red	
5600	5600	—	26.5	37.4	52.9	74.8	106	130	150	150	167	562	562	562	Green	Blue	Red	
6200	—	—	27.8	39.4	55.7	78.7	111	136	157	157	176	622	622	622	Blue	Red	Red	
6800	6800	6800	29.2	41.2	58.3	82.5	117	143	165	165	184	682	682	682	Blue	Gray	Red	
7500	—	—	30.6	43.3	61.2	86.6	122	150	173	173	194	752	752	752	Violet	Green	Red	
8200	8200	—	32.0	45.3	64.0	90.6	128	157	181	181	202	822	822	822	Gray	Red	Red	
9100	—	—	33.7	47.7	67.4	95.4	135	165	191	191	213	912	912	912	White	Brown	Red	
10000	10000	10000	35.4	50.0	70.7	100.0	141	173	200	200	224	103	103	103	Brown	Black	Orange	
11000	—	—	37.1	52.4	74.2	105	148	182	210	210	235	113	113	113	Brown	Brown	Orange	
12000	12000	—	38.7	54.8	77.5	110	155	190	219	219	245	123	123	123	Brown	Red	Orange	
13000	—	—	40.3	57.0	80.6	114	161	197	228	228	255	133	133	133	Brown	Orange	Orange	
15000	15000	15000	43.3	61.2	86.6	122	173	212	245	245	274	153	153	153	Brown	Green	Orange	
16000	—	—	44.7	63.2	89.4	126	179	219	253	253	283	163	163	163	Brown	Blue	Orange	
18000	18000	—	47.4	67.1	94.9	134	190	232	268	268	300	183	183	183	Brown	Gray	Orange	
20000	—	—	50.0	70.7	100.0	141	200	245	283	283	316	203	203	203	Red	Black	Orange	
22000	22000	22000	52.4	74.2	105	148	210	257	297	297	332	223	223	223	Red	Red	Orange	
24000	—	—	54.8	77.5	110	155	219	268	310	310	346	243	243	243	Red	Yellow	Orange	
27000	27000	—	58.1	82.2	116	164	232	285	329	329	367	273	273	273	Red	Violet	Orange	
30000	—	—	61.2	86.6	122	173	245	300	346	346	387	303	303	303	Orange	Black	Orange	
33000	33000	33000	64.2	90.8	128	182	257	315	363	363	406	333	333	333	Orange	Orange	Orange	
36000	—	—	67.1	94.9	134	190	268	329	379	379	424	363	363	363	Orange	Blue	Orange	
39000	39000	—	69.8	98.7	140	197	279	342	395	395	442	393	393	393	Orange	White	Orange	
43000	—	—	73.3	104	147	207	293	359	415	415	464	433	433	433	Yellow	Orange	Orange	
47000	47000	47000	76.6	108	153	217	307	376	434	434	485	473	473	473	Yellow	Violet	Orange	
51000	—	—	79.8	113	160	226	319	391	452	452	505	513	513	513	Green	Brown	Orange	
56000	56000	—	83.7	118	167	237	335	410	473	473	529	563	563	563	Green	Blue	Orange	
62000	—	—	88.0	124	176	249	352	431	498	498	557	623	623	623	Blue	Red	Orange	
68000	68000	68000	92.2	130	184	261	369	452	500	500	522	683	683	683	Blue	Gray	Orange	
75000	—	—	96.8	137	194	274	387	474	500	500	548	753	753	753	Violet	Green	Orange	
82000	82000	—	101	143	202	286	405	496	500	500	573	823	823	823	Gray	Red	Orange	
91000	—	—	107	151	213	302	427	500	500	500	603	913	913	913	White	Brown	Orange	
Nominal Resistance in Megohms																		
0.1	0.1	0.1	112	158	224	316	447	500	500	632	707	104	104	104	Brown	Black	Yellow	
0.11	—	—	117	166	234	332	469	500	500	663	742	114	114	114	Brown	Brown	Yellow	
0.12	0.12	—	122	173	245	346	490	500	500	693	750	124	124	124	Brown	Red	Yellow	
0.13	—	—	128	180	255	361	510	500	500	721	750	134	134	134	Brown	Orange	Yellow	
0.15	0.15	0.15	137	194	274	387	548	500	500	750	750	154	154	154	Brown	Green	Yellow	
0.16	—	—	141	200	283	400	566	500	500	750	750	164	164	164	Brown	Blue	Yellow	
0.18	0.18	—	150	212	300	424	600	500	500	750	750	184	184	184	Brown	Gray	Yellow	
0.20	—	—	150	224	316	447	632	500	500	750	750	204	204	204	Red	Black	Yellow	
0.22	0.22	0.22	150	234	332	469	663	500	500	750	750	224	224	224	Red	Red	Yellow	
0.24	—	—	150	245	346	490	693	500	500	750	750	244	244	244	Red	Yellow	Yellow	

1 Rating @ 70°C, derated to zero @ 130°C.

3 Rating @ 40°C, derated to zero @ 150°C.

2 Rating @ 70°C, derated to zero @ 150°C.

STANDARD RESISTANCE VALUES

Nominal Resistance in Megohms			Maximum Rated Continuous Working Voltage (RCWV) DC or RMS Volts									Resistor Part Number			Resistance Color Code		
TOLERANCE COLOR CODE												WATTAGE and TYPE					
 4th BAND			1/8 1	1/4 2	1/2 2	1 2	2 2	3 2	4 3	4 2	5 3	XX	000	X	1st digit	2nd digit	Number of zeros after 1st & 2nd digit
Gold ±5%	Silver ±10%	None ±20%	BB	CB	EB	GB	HB	GM	GM	HM	HM						
0.27	0.27	—	150	250	350	500	735	500	500	750	750		274		Red	Violet	Yellow
0.30	—	—	150	250	350	500	750	500	500	750	750		304		Orange	Black	Yellow
0.33	0.33	0.33	150	250	350	500	750	500	500	750	750		334		Orange	Orange	Yellow
0.36	—	—	150	250	350	500	750	500	500	750	750		364		Orange	Blue	Yellow
0.39	0.39	—	150	250	350	500	750	500	500	750	750		394		Orange	White	Yellow
0.43	—	—	150	250	350	500	750	500	500	750	750		434		Yellow	Orange	Yellow
0.47	0.47	0.47	150	250	350	500	750	500	500	750	750		474		Yellow	Violet	Yellow
0.51	—	—	150	250	350	500	750	500	500	750	750		514		Green	Brown	Yellow
0.56	0.56	—	150	250	350	500	750	500	500	750	750		564		Green	Blue	Yellow
0.62	—	—	150	250	350	500	750	500	500	750	750		624		Blue	Red	Yellow
0.68	0.68	0.68	150	250	350	500	750	500	500	750	750		684		Blue	Gray	Yellow
0.75	—	—	150	250	350	500	750	500	500	750	750		754		Violet	Green	Yellow
0.82	0.82	—	150	250	350	500	750	500	500	750	750		824		Gray	Red	Yellow
0.91	—	—	150	250	350	500	750	500	500	750	750		914		White	Brown	Yellow
1.0	1.0	1.0	150	250	350	500	750	500	500	750	750		105		Brown	Black	Green
1.1	—	—	150	250	350	500	750	500	500	750	750		115		Brown	Brown	Green
1.2	1.2	—	150	250	350	500	750	500	500	750	750		125		Brown	Red	Green
1.3	—	—	150	250	350	500	750	500	500	750	750		135		Brown	Orange	Green
1.5	1.5	1.5	150	250	350	500	750	500	500	750	750		155		Brown	Green	Green
1.6	—	—	150	250	350	500	750	500	500	750	750		165		Brown	Blue	Green
1.8	1.8	—	150	250	350	500	750	500	500	750	750		185		Brown	Gray	Green
2.0	—	—	150	250	350	500	750	500	500	750	750		205		Red	Black	Green
2.2	2.2	2.2	150	250	350	500	750	500	500	750	750		225		Red	Red	Green
2.4	—	—	150	250	350	500	750	500	500	750	750		245		Red	Yellow	Green
2.7	2.7	—	150	250	350	500	750	500	500	750	750		275		Red	Violet	Green
3.0	—	—	150	250	350	500	750	500	500	750	750		305		Orange	Black	Green
3.3	3.3	3.3	150	250	350	500	750	500	500	750	750		335		Orange	Orange	Green
3.6	—	—	150	250	350	500	750	500	500	750	750		365		Orange	Blue	Green
3.9	3.9	—	150	250	350	500	750	500	500	750	750		395		Orange	White	Green
4.3	—	—	150	250	350	500	750	500	500	750	750		435		Yellow	Orange	Green
4.7	4.7	4.7	150	250	350	500	750	500	500	750	750		475		Yellow	Violet	Green
5.1	—	—	150	250	350	500	750	500	500	750	750		515		Green	Brown	Green
5.6	5.6	—	150	250	350	500	750	500	500	750	750		565		Green	Blue	Green
6.2	—	—	150	250	350	500	750	500	500	750	750		625		Blue	Red	Green
6.8	6.8	6.8	150	250	350	500	750	500	500	750	750		685		Blue	Gray	Green
7.5	—	—	150	250	350	500	750	500	500	750	750		755		Violet	Green	Green
8.2	8.2	—	150	250	350	500	750	500	500	750	750		825		Gray	Red	Green
9.1	—	—	150	250	350	500	750	500	500	750	750		915		White	Brown	Green
10	10	10	150	250	350	500	750	500	500	750	750		106		Brown	Black	Blue
11	—	—	150	250	350	500	750	500	500	750	750		116		Brown	Brown	Blue
12	12	—	150	250	350	500	750	500	500	750	750		126		Brown	Red	Blue
13	—	—	150	250	350	500	750	500	500	750	750		136		Brown	Orange	Blue
15	15	15	150	250	350	500	750	500	500	750	750		156		Brown	Green	Blue
16	—	—	150	250	350	500	750	500	500	750	750		166		Brown	Blue	Blue
18	18	—	150	250	350	500	750	500	500	750	750		186		Brown	Gray	Blue
20	—	—	150	250	350	500	750	500	500	750	750		206		Red	Black	Blue
22	22	22	150	250	350	500	750	500	500	750	750		226		Red	Red	Blue
24	—	—	150	250	350	500	750	500	500	750	750		246		Red	Yellow	Blue
27	27	—	150	250	350	500	750	500	500	750	750		276		Red	Violet	Blue
30	—	—	150	250	350	500	750	500	500	750	750		306		Orange	Black	Blue
33	33	33	150	250	350	500	750	500	500	750	750		336		Orange	Orange	Blue
36	—	—	150	250	350	500	750	500	500	750	750		366		Blue	Blue	Blue
39	39	—	150	250	350	500	750	500	500	750	750		396		Orange	White	Blue
43	—	—	150	250	350	500	750	500	500	750	750		436		Yellow	Orange	Blue
47	47	47	150	250	350	500	750	500	500	750	750		476		Yellow	Violet	Blue
51	—	—	150	250	350	500	750	500	500	750	750		516		Green	Brown	Blue
56	56	—	150	250	350	500	750	500	500	750	750		566		Green	Blue	Blue
62	—	—	150	250	350	500	750	500	500	750	750		626		Blue	Red	Blue
68	68	68	150	250	350	500	750	500	500	750	750		686		Blue	Gray	Blue
75	—	—	150	250	350	500	750	500	500	750	750		756		Violet	Green	Blue
82	82	—	150	250	350	500	750	500	500	750	750		826		Gray	Red	Blue
91	—	—	150	250	350	500	750	500	500	750	750		916		White	Brown	Blue
100	100	100	150	250	350	500	750	500	500	750	750		107		Brown	Black	Violet

1 Rating @ 70°C, derated to zero @ 130°C.

3 Rating @ 40°C, derated to zero @ 150°C.

2 Rating @ 70°C, derated to zero @ 150°C.

EXPLANATION OF PART NUMBERS

All Allen-Bradley fixed composition resistors are identified by a Part Number which will provide information as to the type of resistor, resistance value, and tolerance. The Part Number is merely for identification on drawings, specifications, ordering, and other areas where it is convenient to use a Part Number to describe a particular resistor. The only markings that appear on the resistor are the Color Code bands.

INDUSTRIAL GRADE TYPE DESIGNATION — **EB 514 5**

TYPE OR STYLE			
Allen-Bradley	Rating (Watts) (at 70°C)	MIL-R-11 Style	MIL-R-39008 Style
BB	1/8	RC05	RCR05
CB	1/4	RC07	RCR07
EB	1/2	RC20	RCR20
GB	1	RC32	RCR32
HB	2	RC42	RCR42
GM	3	—	—
HM	4	—	—

TYPE
Fixed Composition Resistors, Insulated, Established Reliability

RESISTANCE
Expressed in ohms and identified by a three-digit number. First two digits represent significant figures. Last digit specifies the number of zeros to follow, except below 10 ohms (see below)

FOR VALUES BELOW 10 OHMS:	
ALLEN-BRADLEY DESIGNATION	MIL DESIGNATION
The letter "G" is substituted in place of the third digit. The desired resistance value is then the first two digits multiplied by 0.1.	The letter "R" is substituted in place of a significant digit to represent the decimal point. The following digits represent significant figures.

EXAMPLE		
Allen-Bradley	Resistance	MIL Designation
27G	2.7 Ohm	2R7

RESISTANCE TOLERANCE		
Allen-Bradley	Tolerance	MIL Designation
5	±5%	J
1	±10%	K
2	±20%	—

FAILURE RATE LEVEL	
At 50% rated wattage expressed in %/1000 hrs.	
M = 1.0%	
P = 0.1%	
R = 0.01%	
S = 0.001%	

MIL-R-39008 TYPE DESIGNATION → **RCR 20 G 514 JS**MIL-R-11 TYPE DESIGNATION → **RC20 GF514J**

MAXIMUM AMBIENT TEMPERATURE AND RESISTANCE TEMPERATURE CHARACTERISTIC
(Refer to MIL-R-11 or MIL-R-39008 Specifications as Applicable)

Standard Color Code and Preferred Number Series

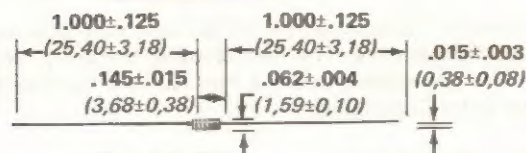
First Band — 1st Digit					
Second Band — 2nd Digit					
Color	Digit	Multiplier	Tolerance	Reliability Level ■ (Percent Per 1000 Hours)	
Black	0	1	—	—	—
Brown	1	10	—	M = 1.0%	—
Red	2	100	—	P = 0.1%	—
Orange	3	1000	—	R = 0.01%	—
Yellow	4	10,000	—	S = 0.001%	—
Green	5	100,000	—	—	—
Blue	6	1,000,000	—	—	—
Violet	7	10,000,000	—	—	—
Gray	8	—	—	—	—
White	9	—	—	—	—
Gold	—	0.1	±5%	—	—
Silver	—	—	±10%	—	—
No color	—	—	±20%	—	—

Preferred Number Series						
±5% Tolerance	10	15	22	33	47	68
	11	16	24	36	51	75
	12	18	27	39	56	82
	13	20	30	43	62	91
±10% Tolerance	10	15	22	33	47	68
	12	18	27	39	56	82
±20% Tolerance	10	15	22	33	47	68

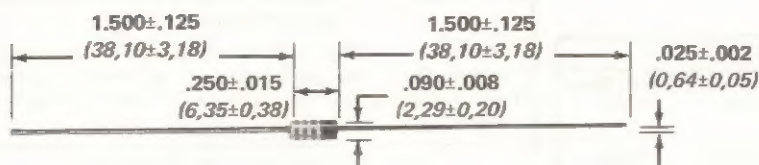
■ When Applicable

DIMENSIONS

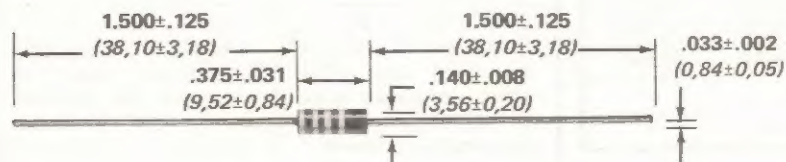
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Type BB



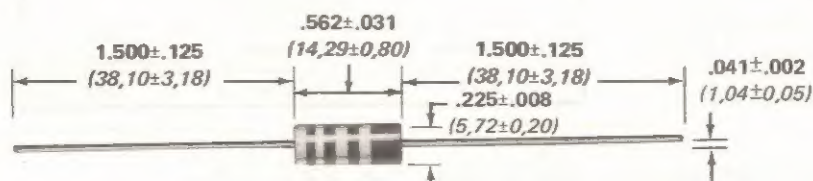
1/4 Watt
Type CB



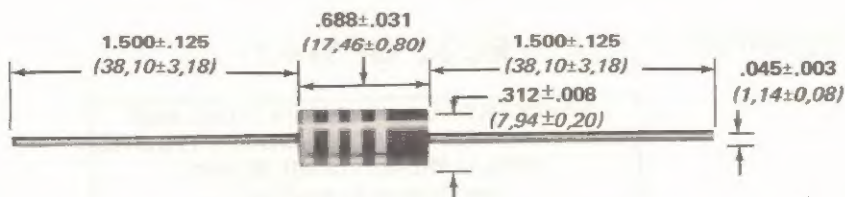
1/2 Watt
Type EB



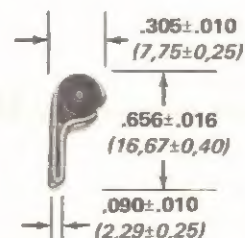
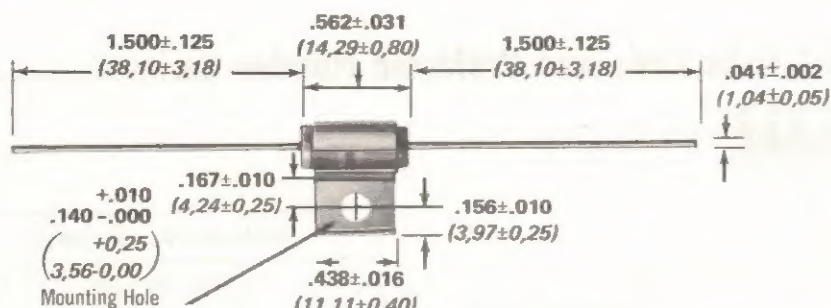
1 Watt
Type GB



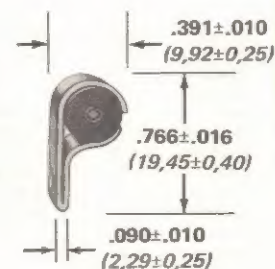
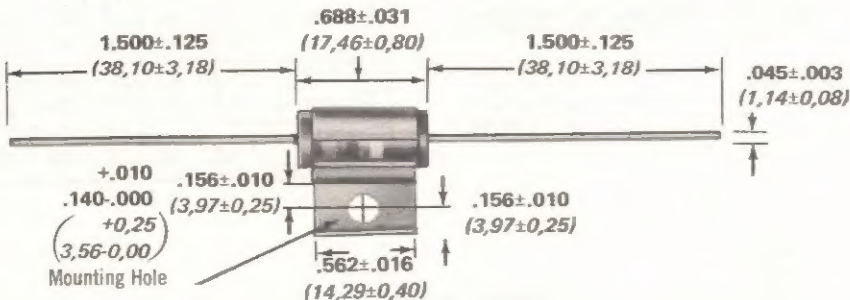
2 Watt
Type HB



3 Watt
Type GM



4 Watt
Type HM



Dimensions shown in *ITALICS* are in Millimeters.

